

CLAIMS

What is claimed is:

1. A cap assembly, comprising:  
a cap plate having a port aperture and an electrolyte injection hole;  
an electrode port which engages the port aperture;  
a gasket installed to surround the electrode port to insulate the electrode port from the cap plate; and  
a plug which is plugged into the electrolyte injection hole by pressing and having an upper rim that matches an upper edge of the electrolyte injection hole.
  
2. The cap assembly of claim 1, wherein:  
the electrolyte injection hole comprises first and second tapering portions with different slopes; and  
the plug comprises a body and an extension extending from the body,  
wherein the body of the plug contacts the first tapering portion tightly and the extension contacts the second tapering portion tightly when the plug is pressed into the electrolyte injection hole.
  
3. The cap assembly of claim 1, wherein a top surface of the plug is aligned with a top surface of the cap plate when the plug is fitted into the electrolyte injection hole.
  
4. The cap assembly of claim 1, wherein a boundary between the electrolyte injection hole and the plug is sealed by welding after the plug is fitted into the electrolyte injection hole, so that a welded portion is formed along the boundary.
  
5. The cap assembly of claim 1, wherein an outer surface of the plug is coated with a polymer, and the plug is fitted into the electrolyte injection hole by pressing.
  
6. A secondary battery, comprising:  
a battery unit formed by rolling a stack of a negative plate, a separator, and a positive plate;

a cap assembly comprising: a cap plate having a port aperture and an electrolyte injection hole;  
an electrode port which engages the port aperture;  
a gasket installed to surround the electrode port to insulate the electrode port from the cap plate;  
a plug which is plugged into the electrolyte injection hole by pressing and having an upper rim that matches an upper edge of the electrolyte injection hole; and  
an electrode tab drawn out from one of the negative plate and the positive plate and electrically connected to the electrode port.

7. The secondary battery of claim 6, wherein:  
the electrolyte injection hole comprises first and second tapering portions with different slopes; and  
the plug comprises a body and an extension extending from the body,  
wherein the body of the plug contacts the first tapering portion tightly and the extension contacts the second tapering portion tightly when the plug is pressed into the electrolyte injection hole.

8. The secondary battery of claim 6, wherein a top surface of the plug is aligned with a top surface of the cap plate when the plug is fitted into the electrolyte injection hole.

9. The secondary battery of claim 6, wherein a boundary between the electrolyte injection hole and the plug is sealed by welding after the plug is fitted into the electrolyte injection hole, so that a welded portion is formed along the boundary.

10. The secondary battery of claim 1, wherein an outer surface of the plug is coated with a polymer and the plug is fitted into the electrolyte injection hole by pressing.

11. A plug for a secondary battery that includes a battery unit, a can which accommodates the battery unit, and a cap assembly with an electrolyte injection hole, the plug pluggable into the electrolyte injection hole, the plug comprising:  
a body having an upper rim that matches an upper edge of the electrolyte injection hole;  
and

an extension extending from the body,  
wherein the body of the plug contacts a first tapering portion of the electrolyte injection hole tightly and the extension of the plug contacts a second tapering portion of the electrolyte injection hole tightly when the plug is fitted into the electrolyte injection hole.

12. The plug of claim 11, wherein a top surface of the plug is aligned with a top surface of a cap plate when the plug is fitted into the electrolyte injection hole, wherein the cap plate substantially matches an upper edge of the can.

13. The plug of claim 11, further comprising a welded portion formed on a boundary between the electrolyte injection hole and the plug.

14. The plug of claim 11, wherein an outer surface of the plug is coated with a polymer and the plug is fitted into the electrolyte injection hole by pressing.

15. The plug of claim 11, wherein the electrolyte injection hole tapers from a first hole toward a third hole via sections having different slopes, wherein the electrolyte injection hole includes a first tapering portion between the first hole and a second hole and a second tapering portion between the second hole and the third holes.

16. The plug of claim 15, wherein the first tapering portion is more tapered than the second tapering portion to create a wider entry than exit.

17. The plug of claim 15, wherein the plug comprises:

a body; and

an extension extending from the body,

wherein the body fits the first tapering portion of the electrolyte hole and wherein, when the plug is fully inserted into the electrolyte injection hole, a top surface of the body is aligned with a top surface of a cap plate and a rim of the body substantially matches an upper edge of the electrolyte injection hole.

18. The plug of claim 17, wherein the body has a thickness that is substantially equal to a distance from an entry of the electrolyte injection hole to a boundary between the first and second tapering portions

19. The plug of claim 17, wherein a size of the body is one of:  
a size that fits the first tapering portion of the electrolyte injection hole; and  
a size slightly larger than the first tapering portion so that the body is fitted by pressing.
20. The plug of claim 17, wherein the extension extending downward from the body is smaller in diameter than the body and fits into the second tapering portion of the electrolyte injection hole by pressing.
21. The plug of claim 17, wherein the plug is welded to a rim of the electrolyte injection hole.